6. Chapter Six, Quality Assurance

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6.1. Program

The Collider-Accelerator (C-A) Department has adopted, in its entirety, the BNL Quality Assurance Program. This QA Program describes how the various BNL management system processes and functions provide a management approach which conforms to the basic requirements defined in DOE Order 414.1A, Quality Assurance.

The quality program embodies the concept of the "graded approach," i.e., the selection and application of appropriate technical and administrative controls to work activities, equipment and items commensurate with the associated environment, safety and health risks and programmatic impact. The graded approach does not allow internal or external requirements to be ignored or waived, but does allow the degree of controls, verification, and documentation to be varied in meeting requirements based on environment, safety and health risks and programmatic issues.

The BNL QA Program is implemented within the C-A Department using C-AD QA implementing procedures. These procedures supplement the BNL Standards Based Management System (SBMS) documents for those QA processes that are unique to the C-A Department. C-AD QA procedures are developed by C-AD QA and maintained in Chapter 13 of the C-AD Operations Procedures Manual.

The C-AD QA philosophy of adopting the BNL Quality Program and developing departmental procedures for the implementation of quality processes within C-AD ensures that complying with requirements will be an integral part of the design, procurement, fabrication, construction and operation of the C-AD complex.

A Quality Representative has been assigned to serve as a focal point to assist C-AD management in implementing QA program requirements. The Quality Representative has the authority, unlimited access, both organizational and facility, as personnel safety and training allows, and the organizational freedom to:

- assist line managers in identifying potential and actual problems that could degrade the quality of a process/item or work performance
- recommend corrective actions
- verify implementation of approved solutions

All C-AD personnel have access to the Quality Representative for consultation and guidance in matters related to quality.

6.2. Personnel Training and Qualifications

The BNL Training and Qualification Management System within the Standards Based Management System (SBMS) supports C-AD management's efforts to ensure personnel working within the C-AD complex are trained and qualified to carry out their assigned responsibilities. The BNL Training and Qualification Management System is implemented within the C-A Department with the C-AD Training and Qualification Plan of Agreement.[1]

6.3. Quality Improvement

The BNL Quality Management System, supplemented by C-AD procedures, provides the requirements for identifying, documenting and dispositioning nonconformances and for establishing appropriate corrective and preventive actions that are based on identified causes. The BNL Quality Management System provides guidance for trending nonconformances to recognize recurring, generic or long-term problems.

The decision to initiate quality improvement is based upon an evaluation of the seriousness, and the adverse cost, schedule, safety and environmental impact of the nonconformance relative to the cost and difficulty of its correction. In some cases, corrective action may not be feasible.

The C-AD Self Assessment Program provides information on scientific, business and operational performance for C-A's management, staff, customers, stakeholders and regulators. Self-assessment also provides a mechanism for improving the rules that

[1] http://www.agshome.bnl.gov/AGS/Accel/SND/Training/trainplan.pdf C-A Department Training and Qualifications Plan

govern training and qualifications, documents and records, work process, design, procurement, inspection and testing, and the assessment process itself. The Self-Assessment program evaluates performance relative to critical outcomes and internal performance objectives in order to identify strengths and opportunities for improvements within the C-A Department.

6.4. Documents and Records

The BNL Records Management System and controlled document Subject Areas within SBMS, supplemented by C-AD procedures, provide the requirements and guidance for the development, review, approval, control and maintenance of documents and records.

C-AD documents encompass technical information or instructions that address important work tasks, and describe complex or hazardous operations. They include plans, procedures, instructions, drawings, specifications, standards and reports.

C-AD records are information of any kind and in any form, created, received and maintained as evidence of functions, policies, decisions, procedures, operations, or other activities performed within the Department. Records are retrievable for use in the evaluation of acceptability, and verification of compliance with requirements. C-AD records are protected against damage, deterioration or loss.

6.5. Work Process

Work is performed employing processes deployed through the BNL SBMS. SBMS Subject Areas are used to implement BNL-wide practices for work performed. Subject Areas are developed in a manner that provides sufficient operating instructions for most activities. However, C-AD management has determined that it is appropriate to develop internal procedures to supplement the SBMS Subject Areas. These internal C-AD procedures are bounded by the requirements established by the BNL Subject Areas.

Group leaders and technical supervisors are responsible for ensuring that employees under their supervision have appropriate job knowledge, skills, equipment and resources necessary to accomplish their tasks. Contractors and vendors are held to the same practices.

The Quality Management System, supplemented by C-AD procedures, provides processes for identifying and controlling items and materials to ensure their proper use and maintenance to prevent damage, loss or deterioration.

C-AD management has identified those processes requiring calibrated measuring and testing equipment. Item identification and control requirements are specified, when necessary, in appropriate documents, e.g., drawings, specifications and instructions. Materials undergoing tests or inspections are controlled to avoid the commingling of acceptable items with items of unknown origin or history, thus avoiding inadvertent use.

C-AD management delegates authority to all C-AD personnel to “Stop Work” to avoid unsafe work practices.

6.6. Design

The C-AD staff plans, develops, defines and controls the design of the C-AD complex in a manner that assures the consistent achievement of objectives for productivity, performance, safety and health, environmental protection, reliability, maintainability and availability. Design planning establishes the milestones at which design criteria, standards, specifications, drawings and other design documents are prepared, reviewed, approved and released.

The design criteria define the performance objectives, operating conditions, and requirements for safety and health, reliability, maintainability and availability, as well as the requirements for materials, fabrication, construction, and testing. Appropriate codes, standards and practices for materials, fabrication, construction, testing, and processes are defined in the design documentation. Where feasible, nationally recognized codes, standards and practices are used. When those are either overly restrictive, or fall short of defining the requirements, they are modified, supplemented, or replaced by BNL specifications.

Specifications, drawings and other design documents are used to represent verifiable engineering delineations, in pictorial and/or descriptive language, of parts, components or assemblies in the C-AD complex. These documents are prepared, reviewed, approved and released in accordance with C-AD procedures. Changes to these documents are processed in accordance with the C-AD configuration management procedures.

6.7. Procurement

Personnel responsible for the design or performance of items or services to be purchased ensure that the procurement requirements of a purchase request are clear and complete. Using the graded approach, potential suppliers of critical, complex, or costly items or services are evaluated in accordance with predetermined criteria to ascertain that they have the capability to provide items or services that conform to the technical and quality requirements of the procurement. The evaluation includes a review of the supplier's history with BNL or other DOE facilities, or a pre-award survey of the supplier's facility. C-AD personnel ensure that the goods or services provided by the suppliers are acceptable for intended use.

6.8. Inspection and Acceptance Testing

The BNL Quality Management System within the SBMS, supplemented by C-AD procedures, provides processes for the inspection and acceptance testing of an item, service or process against established criteria and provides a means of determining acceptability. Based on the graded approach, the need and/or degree of inspection and acceptance testing are determined during the activity/item design stage. Inspection/test planning has as an objective the prompt detection of nonconformances that could adversely affect performance, safety, reliability, schedule or cost.

When required, acceptance and performance criteria is developed and documented for key, complex or critical inspection/test activities. If an item is

nonconforming, it is identified to avoid its inadvertent use. These processes also specify how inspection and test status are indicated either on the item itself, or on documentation traceable to the item.

The BNL Calibration Subject Area, supplemented by C-AD procedures, describes the calibration process for measuring and test equipment. C-AD management identifies appropriate equipment requiring calibration. The calibration status is readily discernible and associated calibration procedures, documentation, and records are prepared and maintained. Calibrated equipment is properly protected, handled and maintained to preclude damage that could invalidate its accuracy. Measuring and test equipment found out of calibration is identified and its impact evaluated.

6.9. Management Assessment

The managers of the four C-AD Divisions periodically evaluate or "self-assess" the effectiveness of the C-AD organization and present their report to senior management. Through the C-AD Self-Assessment Program, a regular, systematic evaluation process has been established wherein C-AD assesses internal management systems and processes used to make fact-based decisions. For example, see the FY03 C-AD Self-Assessment Plan. The C-AD Self-Assessment Program includes such items as: performance measures; compliance checks; effectiveness evaluations; job assessments; surveys; and environment, safety and health walk-throughs. Strengths and opportunities for improvement are identified. Assessment results are documented and fed back to managers, and provided valuable input into the business-planning process.

C-AD's Environment Management System and Occupational Safety and Health (OSH) Management System and associated activities also undergo management review each year. In addition, these management systems are reviewed by third-party registrars, and federal, New York State and County agencies. Together these elements provide comprehensive and objective information used by C-AD management in establishing strategic direction and improving environmental and OSH performance.

6.10. Independent Assessment

Using the graded approach, C-AD Management periodically evaluates the implementation of the BNL Management Systems, SBMS Subject Areas and C-AD specific processes. This is done through reviews, assessments and/or other formal means. The C-AD QA Group performs these assessments. They include an evaluation of the safety and quality cultures in terms of the adequacy and effectiveness of the management structure, which includes, but not limited to, environment, safety and health, quality, conduct of operations, and training requirements.

Individuals verifying these activities have sufficient authority to access work area, and organizational freedom to accomplish the following: identify problems, initiate, recommend, or provide solutions to problems through designated channels, and verify implementation of solutions.

All assessments are planned and conducted using established criteria. The type and frequency of these assessments are based on the status, complexity and importance of the work or process being assessed. The results are documented, non-conformances and

recommendations identified and presented to C-A Department management. The Department develops corrective actions to promote improvement. Actions are tracked to closure by C-AD QA in the Family version of the BNL Assessment Tracking System (ATS). Those conducting independent assessments are technically qualified and knowledgeable in the areas assessed and are independent from the activities assessed. Where necessary, subject matter experts are involved in the assessments to give insight into a particular area.

In addition, peer review is a process used at C-AD by which the quality, productivity and relevance of science and technology programs is monitored and evaluated. In operational and environment, safety and health arenas, peer review is used to evaluate and independently verify engineering design and operational implementation.